

**REMARKS*****Status of the Claims***

Claims 1-12 are pending, with claim 1 being independent. Without conceding the propriety of the rejections, claim 1 has been amended to even more clearly recite and distinctly claim the present invention. New claim 13 has been added. Support for the amendment and new claim may be found throughout the specification, including, for example, at page 5, lines 4 – 13 and at page 15, lines 11-13. Accordingly, no new matter has been added.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendment and the following remarks.

***Claim Rejections under U.S.C. §103(a)***

Claims 1 – 12 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,160,026 (“Dai”). Applicants respectfully disagree with the rejection; therefore, this rejection is traversed.

Dai relates a process for producing hydrocarbons from hydrogen and carbon monoxide by reacting hydrogen and carbon monoxide in the presence of a particulate solid catalyst in a manner which effectively controls the exothermic heat of reaction. (Column 4, Lines 48 – 52). Dai discloses that fluids and gas exiting the reactor pass to a separator. A substantially inert fluid exits the separator. A portion of this fluid may be withdrawn as product and the remaining fluid may be cooled with a heat exchanger and then passed back to the reactor. (Column 11, Lines 15 – 31). Dai discloses that the recycled liquids are of a boiling point sufficiently higher than the reaction temperature so as to not produce significant vapor phase. (Column 11, Lines 59 – 62).

In contrast, as recited in claim 1, the presently claimed invention relates to a method of controlling the temperature of an exothermic reaction. In the presently claimed method a gaseous reactant is contacted with a catalyst to form reaction products within a reactor, the reaction products existing in both a liquid and vapor phase. At least a portion of the vapor phase reaction products are removed from the reactor and at least a portion of the removed vapor phase reaction products are condensed at a location outside the reactor to form a volatilizable liquid. At least a portion of the volatilizable liquid is

injected into the liquid phase reaction products contained within the reactor. The volatilizable liquid comprises at least 10 percent by weight C<sub>11+</sub> hydrocarbons and has a boiling point substantially the same as the reaction temperature. As recited in claim 13, the volatilizable liquid comprises at least 10 percent by weight C<sub>11+</sub> hydrocarbons and has a boiling point such that at least 30 wt% of the volatilizable liquid boils under reaction conditions.

Applicants note that the volatilizable liquid *comprises* at least 10 percent by weight C<sub>11+</sub> hydrocarbons. The claims do *not* require recycling at least 10 percent of the heavier portion of the liquid hydrocarbon product. Applicants further note that as recited in claim 1, the volatilizable liquid has a boiling point substantially the same as the reaction temperature and as recited in claim 13, the volatilizable liquid has a boiling point such that at least 30 wt% of the liquid boils under reaction conditions.

As explained in the specification, there are advantages in selecting hydrocarbons in the highest boiling point range of the materials exiting the reactor in the vapor phase along with lower boiling hydrocarbons for use as the volatilizable liquid. The higher boiling hydrocarbons include, in particular, C<sub>11+</sub> hydrocarbons. The volatilizable liquid, thus selected, boils at a temperature that is substantially the same as the reaction temperature, and as a consequence, its removal from the reactor provides an effective method by which the temperature of the contents of reactor may be controlled. Since the boiling point of the recycled volatilizable liquid is close to the reaction temperature, it is more effective in maintaining control of the reactor temperature at the desired set point. In addition to effectively maintaining control of the reactor temperature, the volatilizable liquid boiling substantially the same as the reaction temperature may lower the partial pressure for the syngas which in turn reduces the reaction rate.

As recited in claim 13, the volatilizable liquid has as high of a molecular weight as possible provided that at least 30 wt% of the liquid boils under reaction conditions. As such, in addition to effectively maintaining control of the reactor temperature, the volatilizable liquid lowers the partial pressure for the syngas which in turn reduces the reaction rate.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or

in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143.

Applicants respectfully submit that Dai does not disclose or suggest all the claim limitations. As described above Dai discloses that the recycled liquids are of a boiling point *sufficiently higher than the reaction temperature so as to not produce significant vapor phase*. Accordingly, Dai does not disclose or suggest injecting a volatilizable liquid into the liquid phase reaction products contained within a reactor, wherein the volatilizable liquid comprises *at least 10 percent by weight C<sub>11+</sub> hydrocarbons* and has a *boiling point substantially the same as the reaction temperature*. Furthermore, Dai does not disclose or suggest injecting a volatilizable liquid into the liquid phase reaction products contained within a reactor, wherein the volatilizable liquid comprises *at least 10 percent by weight C<sub>11+</sub> hydrocarbons* and has a boiling point such that *at least 30 wt% of the volatilizable liquid boils* under reaction conditions.

For at least the reasons set forth above, Dai does not render the presently claimed invention obvious. Accordingly, withdrawal of the obviousness rejection is respectfully requested.

### ***Conclusion***

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims.

In view of the foregoing amendments and remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited. The Examiner is invited to contact the undersigned at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted,

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